

What is claim d is:

1. A surgical operation assistance system, comprising:

an image pick-up device for picking up an image of a surgical filed;

5 an image producing unit for producing a stereographic image of the surgical filed, the image of which is picked up;

an input unit for inputting reference points of a surgical operation route upon basis of a kind of the surgical operation and said stereographic image;

10 a surgical operation route calculation unit for calculating a smooth surgical operation route upon basis of said kind of the surgical operation inputted and the reference points;

an image processing unit for processing said stereographic image and said surgical operation route to be displayable; and

15 an image displaying apparatus for displaying the images processed in said image processing unit thereon.

2. The surgical operation assistance system, as described in the claim 1, further comprising an image extracting unit for extracting a partial image from said stereographic image, wherein
20 said image processing unit processes the extracted image to be displayable.

25 3. The surgical operation assistance system, as described in the claim 1, further comprising a slice image arbitrary line input unit for designating an arbitrary line of a sliced image to be displayed, wherein said image processing unit processes the sliced image to be displayable, upon basis of the arbitrary line designated for the slice image.

4. The surgical operation assistance system, as described

in the claim 1, further comprising a surgical operation robot for automatically conduct the surgical operation upon the surgical filed with using the surgical operation tool along with said surgical operation route calculated out.

5 5. The surgical operation assistance system, as described in the claim 2, further comprising a slice image arbitrary line input unit for designating an arbitrary line of a sliced image to be displayed, wherein said image processing unit processes the sliced image to be displayable, upon basis of the arbitrary line
10 designated for the slice image.

15 6. The surgical operation assistance system, as described in the claim 2, further comprising a surgical operation robot for automatically conduct surgical operation upon the surgical filed with using the surgical operation tool along with said surgical operation route calculated out.

7. A surgical operation assistance system, comprising:

an image pick-up device for picking up an image of a surgical filed;

20 a surgical operation robot for conducting surgical operation upon the surgical field with using a surgical operation tool;

a position information integration unit for integrating position information of said surgical operation robot with an image of the surgical field picked up by said image pick-up device;

25 an image producing unit for producing a stereographic image of the surgical field picked up, and for producing an image piling up an image of said surgical operation tool on said stereographic image, upon basis of the information integrated in said position information integration unit;

30 a reference point inputting unit for inputting reference points of a surgical operation route upon basis of a kind of the

surgical operation tool and said stereographic image;

a surgical operation route calculating unit for calculating out a smooth surgical operation route upon basis of the kind of the surgical operation tool and the reference points, which are
5 inputted;

an image processing unit for processing said stereographic image and said surgical operation route to be displayable under a desired condition; and

10 an image displaying apparatus for displaying the image processed in said image processing unit thereon.

8. The surgical operation assistance system, as described in the claim 7, wherein said surgical operation robot is also operable upon the surgical filed, manually, with using the surgical operation tool along with the surgical operation route calculated
15 out, and said surgical operation robot is exchangeable between the automatic operation and the manual operation thereof.

9. A surgical operation assisting method, comprising the following steps of:

20 picking up an image of a surgical filed by means of an image pick-up device;

producing a stereographic image of the surgical filed, the image of which is picked up, in an image producing unit;

25 inputting reference points of a surgical operation route upon basis of a kind of the surgical operation and said stereographic image through an input unit;

calculating a smooth surgical operation route upon basis of said kind of the surgical operation inputted and the reference points in a surgical operation route calculation unit;

processing said stereographic image and said surgical

operation route to be displayable in an image processing unit; and

displaying the images processed in said image processing unit on an image displaying apparatus.

5 10. A surgical operation assisting method, comprising the following steps of:

picking up an image of a surgical filed by means of an image pick-up device;

conducting surgical operation upon the surgical field,
10 manually, with using a surgical operation tool of a surgical operation robot;

integrating position information of said surgical operation robot with an image of the surgical field picked up by said image pick-up apparatus in a position information integration unit;

15 producing a stereographic image of the surgical field picked up, and for producing an image piling up an image of said surgical operation tool on said stereographic image, upon basis of the information integrated in said position information integration unit, in an image producing unit;

20 inputting reference points of a surgical operation route upon basis of a kind of the surgical operation tool and said stereographic image through a reference point inputting unit;

calculating out a smooth surgical operation route upon basis of the kind of the surgical operation tool and the reference points,
25 which are inputted, in a surgical operation route calculating unit;

processing said stereographic image and said surgical operation route to be displayable under a desired condition in an image processing unit; and

displaying the image processed in said image processing

unit on an image displaying apparatus.

11. The surgical operation assisting method, as described in the claim 10, wherein the image of the surgical field is picked up by means of the image pick-up device under a condition where
5 markers are attached thereon in a number of three (3) or more, thereby producing a medical use image, further comprising the following steps of: attaching a same number of markers on an actual patient at positions where said makers are attached, measuring position coordinates of those markers through a three-dimension
10 position measuring apparatus, thereby presenting them in a form of a matrix of 3x3 or more; converting this matrix into a matrix of 3x3 or more for presenting the position coordinates of the markers on said medical use image in said position information integration unit; and producing an image piling up the image of said surgical
15 operation tool on said stereographic image, upon said matrix converted.

12. A program stored on a computer readable storage medium for assisting orthopedic surgical operation, comprising the followings steps of:

20 a step for picking up an image of a surgical filed by means of an image pick-up device;

a step for producing a stereographic image of the surgical filed, the image of which is picked up, in an image producing unit;

25 a step for inputting reference points of a surgical operation route upon basis of a kind of the surgical operation and said stereographic image through an input unit;

30 a step for calculating a smooth surgical operation route upon basis of said kind of the surgical operation inputted and the reference points in a surgical operation route calculation unit;

a step for processing said stereographic image and said

surgical operation route to be displayable in an image processing unit; and

a step for displaying the images processed in said image processing unit on an image displaying apparatus.